

**BOARD FOR INTERNATIONAL FOOD AND AGRICULTURAL DEVELOPMENT**

**175th Public Meeting**

**Resilience Measurement and Analysis**

**Ronald Reagan Building North Tower**

**8th Floor, 1300 Pennsylvania Ave., NW**

**Washington, DC 20004**

**Wednesday, May 9, 2018**

**BOARD MEMBERS:**

**Mark E. Keenum, Chair**

Dr. Brady J. Deaton  
Dr. Waded Cruzado

Mr. Richard L. Lackey  
Dr. Pamela K. Anderson  
Hon. James M. Ash

## Welcome

**Mark Keenum, President of Mississippi State University and BIFAD chair**

**Beth Dunford, Assistant to the Administrator, Bureau for Food Security**

Dr. Keenum began the day by calling the meeting to order and sharing a quick background on BIFAD. He also touched on the goals for the day's agenda. The BIFAD board members briefly introduced themselves before Dr. Keenum introduced Dr. Beth Dunford for opening remarks. Dr. Dunford thanked the Board and spoke of her excitement about the Feed the Future initiative. She also acknowledged the BIFAD award winners present at the meeting. Her key point was that resilience is about managing adversity and change so that it does not compromise the ability of people to manage their livelihoods and support their families. She concluded her remarks by expressing excitement to take up the issues on the agenda and find ways to engage the broader university community.

## Awarding of BIFAD Prize for Scientific Excellence in a Feed the Future Innovation Lab

**Recipient: Laouali Amadou, University of Maradi and National Institute of Agricultural Research (Niger)**

**Recipient: James Beaver, University of Puerto Rico**

**Recipient: Juan Carlos Rosas, Zamorano Pan-American Agricultural University, Honduras**

Dr. Waded Cruzado took the podium and described the conditions necessary to merit consideration for the BIFAD Award. She then announced James Beaver and Juan Carlos Rosas as the award recipients for the senior researcher category. After announcing their names, Dr. Cruzado read a brief background on each winner and the work they do. Dr. Rosas was unavailable to participate in the meeting, so Dr. Jeff Lansdale, President of Zamorano University accepted the award on his behalf.

To introduce James Beaver, the Rectora of the University of Puerto, Dr. Wilma Santiago Gabrielini, took the podium to give some brief remarks about Dr. Beaver and the mission of the science program at the university. Dr. Beaver then gave prepared remarks after receiving his award. He began his speech by thanking his team members and accepting the award on their behalf. He then explained some of the factors that contributed to the success of the Legume Innovation Lab project in Central America and the Caribbean. One major factor was long-term support from USAID that provided continuity of effort and an opportunity to anticipate trends and future threats to production. There was also capable guidance from the Innovation Lab's Management Office at Michigan State University.

A few trends and challenges were described by Dr. Beaver. His team anticipated that bean production would be increased in the humid lowlands of Central America. Growth in this location required varieties

to have greater heat tolerance and resistance to common bacterial blight and web blight. The bean common mosaic necrosis virus has now been found in Central America and the Caribbean. There was free exchange of bean germplasm among research programs, which helped lead to the program's success. Another success factor was the fact that both the UPR and Zamorano are located in Central America and the Caribbean, and that facilitated breeding for endemic tropical disease and local adaptation. The regional focus and collaboration allowed greater impact and regional testing of breeding lines. This provided more information for variety releases.

The team had a capacity to produce basic seeds at Zamorano. This commitment between the UPR and Zamorano facilitated formal and informal training activities. Dr. Beaver used the book *The Black Swan* to make the point that it is important to develop robust systems that can withstand unlikely negative events, such as natural disasters. Redundancy is more important in nature than optimization. In seed programs, a variety should be produced in different season in regions. A portion of the basic seed should be produced during the dry season using irrigation to have a reliable supply of high quality seed. He concluded his remarks by thanking his wife and team once more.

Dr. Jeff Lansdale took the podium to accept the award on behalf of Dr. Rosas. He explained the work Juan Carlos Rosas had done to merit receiving the BIFAD award. Dr. Rosas founded the Bean Research Program at Zamorano in 1988. The program's impact in the region is extensive. The program has developed and released over 60 bean varieties. About 350 million dollars have been infused into the economy from the cultivation of these bean varieties in the region. There are over 200,000 small farmers in Central/South America and the Caribbean that are cultivating these bean crops. There is also improved nutritional content (iron and zinc), resilience to disease, drought, and climate due to growth of these crops.

Dr. Lansdale spoke of the deep appreciation of Juan Carlos Rosas from Zamorano. Since beginning to teach in 1985, over 3,000 students have been taught courses in genetics, plant breeding, and crop production by Dr. Rosas. There are over 50 Zamorano graduates with master's and doctoral studies in genetic research of crops. Dr. Rosas has also done extensive research in genetic improvement, disease resistance and tolerance of drought, heat, and low soil fertility. He closed his presentation with a video about the day-to-day operations of Zamorano University.

Dr. Cruzado took the podium once again to give the introduction for the BIFAD Award recipient Laouali Amadou, who then gave a brief presentation on his work. He began by expressing thanks to his colleagues. He went on to explain the importance of pearl millet, the staple crop of the Sahelian region of Africa. Crop damage from millet head miner can be severe, ranging from 40 to 85%.

There are a few management options for millet head miner. Control with insecticides is not realistic for subsistence farmers because of prohibitive cost and risk to health and the environment. Cultural management has limited applicability. Host plant resistance is still under investigation, and effective biocontrol agents are available. These include *Habrobracon hebetor*, a native parasitoid that causes significant mortality to pests of pearl millet, but the parasitism occurs late in the season when most of the millet panicles are already damaged. Since 2006, the team has been developing a colony of this parasitoid. Mr. Amadou concluded his presentation by explaining ways to use the parasitoid effectively.

## Resilience at USAID

### **Presenter: Greg Collins, Center for Resilience, USAID**

Dr. Keenum introduced Dr. Collins to speak about resilience efforts at USAID. Dr. Collins began his presentation by thanking BIFAD. He also called on the audience to give support for advancing all resilience measurements and research on the topic. He provided a framework for the discussions coming later on in the day.

Dr. Collins puts forth the notion that resilience is not the outcome of interest. The outcomes of interest are wellbeing, poverty, hunger, and malnutrition. Resilience is the ability to manage adversity and change and manage the array of shocks and stresses that households and communities face. It is also the ability to maintain and advance wellbeing despite increasingly complex risk environments.

The work being done is reinforcing preconceptions of such important sources of resilience as access to markets, natural resources, financial services, and agricultural support. A challenge faced when talking about resilience is the locus of resilience. This is the ability of people, households, communities, systems, and countries to mitigate and adapt to change. There is a long way to go when looking at system resilience. Measuring the relationship between market system resilience and other factors is challenging. He concluded his remarks by advocating for the evolution of the approach to resilience

measurement with the insight and deep bench the U.S. universities have.

## **Panel 1: Theoretical Underpinnings of Resilience Measurement**

**Moderator: Mark Conostas, Cornell University, and Chair Technical Working Group on Resilience Measurement**

**Panelist: Dr. Ahmed Mushfiq Mobarak, Yale University**

**Panelist: Dr. Jennifer Cissé, USAID Bureau for Food**

**Security Panelist: Dr. Luca Russo, FAO**

**Panelist: Dr. Joanna Upton, Cornell University**

Dr. Keenum began the session by calling the audience back to order and introducing the moderator of the panel, Dr. Mark Conostas. Dr. Conostas took the podium and made some brief opening remarks. He then introduced each speaker by giving a brief overview of each topic and a short background. Dr. Ahmed Mobarak began his speech by talking about, “how people manage shocks.” The first market for this, he mentioned, is insurance. In rural areas, this can be substituted by informal insurance which refers to community assistance. The second market is credit, taking out loans formally or informally. The third form is self-insurance, meaning savings put away over time. The final method is income diversification. One way to do this is migration from where someone lives. This refers to seasonal migrations around the world.

Following Dr. Mobarak, Dr. Jennifer Cissé delivered her presentation on resilience measurement. Her talk focused exclusively on dynamism. She began with a story about a female dairy entrepreneur named Dhaki in Ethiopia. She was able to sell milk to a processor who received a grant through Ethiopia’s Pastoralist Areas Resilience Improvement and Market Expansion (PRIME) program. She not only sold her own milk but became an aggregator and sold other people’s product. She was able to accumulate savings and stocks through this endeavor. The poverty dynamics of Ethiopia show that more households are falling back into poverty.

Dynamics are measured in a few ways. Panel data are used to track household or individual well-being over a period of time. There has to be control for past levels of well-being. According to Dr. Cissé, “it takes money to make money.” There also has to be non-linear wellbeing dynamics and poverty traps. Another thing being worked on by the team is the idea of Recurrent Monitoring Surveys (RMS). Instead of looking at annual data and asking households to recall, high frequency data allowing for monitoring during a shock and (close to) real-time analysis can be used and can eliminate recall bias. This is cost-effective because it is triggered, there are short surveys, and it utilizes small samples.

After Ms. Cissé, Marco D’Errico took the stage to speak about Resilience Index Measurement and Analysis (RIMA). This is a tool developed at FAO. RIMA is a quantitative approach that estimates household resilience to food insecurity. It uses latent variable models and regression analysis. These models have been adopted in the early 40s and 50s for measuring intelligence. Item response analysis is also employed to support. The big difference with other multi-dimensional indexes is how the weights

are estimated. Regression analysis is otherwise adopted to run causal inference and estimates main determinants of resilience and food security recovery.

The four key dimensions of RIMA are adaptive capacity, social safety nets, access to basic services, and assets. The reason these are insisted upon so frequently is that they are directly observable and usable from policy makers and are strictly linked to the actual roll-out of programmatic efforts. The FAO team is also trying to explore linkage with different aspects of resilience. Some of these include social inclusion and well-being perceptions, the effects of conflict on food security and resilience, gender dimensions of resilience, and the role of social protection for enhancing resilience. The final messages of RIMA Analyses are the importance of drawing on psychometric theory to measure resilience (and constructs in general), this leads to more accurate measurement; the importance of choosing the dimensions of resilience; and the use of measurement to explain cause and effect relationships related to resilience.

Dr. Joanna Upton took the stage to speak about the usefulness of the concept of resilience for emergency response. She began by giving a brief background on her own work. The first principle she spoke of was the alignment between definition and measurement. The operating theory of resilience has several common threads. Each measurement method speaks to the theory debate (implicitly or explicitly), capturing and/or emphasizing some elements of the definition. This leads to the debate of whether resilience is one outcome or a suite of outcomes. Another debate is if it is the inverse of vulnerability, the path to recovery, or both. The recovery state is viewed as either a return to the starting state or persistence in maintaining a normative state. Underlying all of this is the idea of how well time is reflected.

The second principle focused on was the alignment between measurement and goals. The analytical set of goals is descriptive, those who are resilient and the drivers of resilience; comparative, resilience and its drivers across contexts; inferential, the assessment of impacts of shocks and/or policies on resilience; and predictive, the identification of who will be likely to be resilient to a shock. The pragmatic set of goals includes the ability to identify the impacts of programs or to better target resources to the poor/non-resilient, as well as other logistical considerations such as data availability, cost, and replicability. An example Dr. Upton used to illustrate these concepts was drawn from work with Kimetrica applying the Cissé and Barrett method to LSMS data from Ethiopia. The example showed that, while there is a strong correlation between the resilience score developed through the method and the simple outcome variable, if one were to target resources based on the resilience score one identifies different households; and those identified by the resilience score seem to be worse off across other criteria.

Following the presentations, Dr. Conostas came on stage to make some remarks and set the tone for the panel discussions that followed each speaker's presentation. He also went on to speak about the usefulness of theory and theoretical analysis. His final point was on the importance of dynamics and the changes that may occur. He spoke about looking at how long it takes for changes to occur in these dynamics. He referred to this idea as forces that can critically affect certain dynamics. After his brief comments, Dr. Conostas began moderating the panel by facilitating questions submitted electronically and offered by the audience.

## Panel 2: Applied Resilience Measurement

**Moderator: Tiffany Griffin, Center for Resilience**

**Panelist: Marco D'Errico, FAO**

**Panelist: Tim Frankenberger, TANGO**

**Panelist: Jon Kurtz, Mercy Corps**

**Panelist: Lynn Michalopolous, Columbia University**

**Panelist: Dr. Erwin Knippenberg, Cornell University**

Dr. Keenum reconvened the meeting and introduced Dr. Tiffany Griffin as the moderator for the panel session. Dr. Griffin began by referring back to the earlier panel's discussion and putting in context some of the principles discussed there as they may relate to the current panel's ideas. Dr. Tim Frankenberger came to the podium first for his presentation. He began by speaking on his work on recurrent monitoring surveys. He measured resilience as the ability to manage or recover from shocks. This timeline begins with a set of capacities which are then realized in relation to a disturbance that later affects well-being outcomes and trajectories. Resilience capacities represent people's resources, conditions, and abilities that they use to cope with shocks or stresses. Panel data controls for many variables to see how an individual changes over time. Real-time data collection shows how people cope after a shock.

Some mixed methods used were the combination of quantitative and qualitative data. Quantitative data collected data on shocks and coping strategies as well as questionnaires. Qualitative data used focus group discussions and key informant interviews. It also collects more nuanced data on shocks, perceptions, and why people responded the way they did. Collecting data after a shock in regular intervals tracks how people are managing shocks and downstream effects over time.

The program implications were extensive. Comprehensive, multi-sectoral programming has helped strengthen household and community resilience capacities to manage drought. Protecting livestock assets from unplanned deaths can be critical through fodder and water provision, market off-take, and veterinary houses. Access to financial services and markets are also critical for diversifying livelihoods into activities not as susceptible to climactic risks. Social capital is critical to resilience and can be strengthened through group formation. Using good trigger indicators to determine the timing, scale, and duration of formal cash and food transfers can help households manage drought without using negative coping strategies. Hazard insurance and disaster risk reduction interventions also show promise.

Dr. Marco D'Errico took the podium for a second to give a follow up on the RIMA presentation he gave in the previous panel discussion. RIMA takes into account several types of shocks. In this case, he explained idiosyncratic and covariate shocks. Idiosyncratic shocks are things such as livestock death, job loss, and illness of a household member. These shocks are self-reported and specific to individual households. Covariate shocks are divided into climate shocks such as droughts, floods, rainfalls, and other natural hazards; conflict-related shocks such as war, murders, and social disorders; and market shocks such as input/output fluctuations.

Dr. Lynn Michalopolous delivered her presentation on psychosocial factors with the resilience framework. The outcomes of these factors can have a burden on family and communities, increase HIV risk, and be a threat to human rights and social justice. It can also decrease self-efficacy. The project she has most recently been working on focuses on developing a global post-trauma symptom scale. This was motivated by several reasons such as the appropriateness of instruments that currently exist in the face of trauma, discrepancies in epidemiological data, the global mental health debate, and the development of appropriate and free instruments that can be applied in multiple settings and contexts.

The project steps were as follows: a systematic review of qualitative studies related to past trauma symptoms, item-response theory analysis of PTSD symptoms from a multi-country dataset to examine which symptoms perform the best across contexts, drafting instruments based on results, consultation with global mental health experts, and finally piloting and validating instruments. The take-home messages were that psychosocial factors matter in relation to shocks and stresses, must be accounted for and can be measured, are associated with all resilience capacities, and that context always matters.

After this presentation, Mr. John Kurtz gave his speech on resilience and conflict shocks. He began by acknowledging drivers of conflicts outside of our control and the need to reduce people's exposure to this conflict. This leads to the development of intense risk management. Another approach is predicting future incidents of conflict. This is done by doing polling and using machine learning techniques to try and gain a strong sense of when and where conflict may break out.

Dr. Erwin Knippenberg gave his presentation on the project of measuring high-frequency data. He began by speaking about an area in Malawi that is often hit by conflict. They began by tracking shocks as they were experienced and how people were perceiving these shocks. After this, the group moved to quantify shock and calculate the persistence of these shocks. This was done to find the correlation between household characteristics and shock persistence.

Following the presentations, Dr. Griffin gave a brief recap of each panelist's speech before opening the panel for audience and electronic questions.

## **Brainstorming Session: Leveraging University Capacity in Resilience Measurement: Research, Networks, and Training the Next Generation**

**Moderator: Jennifer Cissé, USAID Bureau for Food Security**



**Panelist: Nancy Mock, Tulane University**

**Panelist: Tiffany Griffin, USAID Center for Resilience**

**Panelist: Ed Carr, Clark University**

**Panelist: Josh Ayers, Food for the Hungry**

Dr. Keenum introduced the session and brought up Dr. Jennifer Cissé, the moderator for the panel. Dr. Cissé took the podium and made some opening remarks on the session and introduced the panelists. Each panelist then took a brief minute to give a little bit of background to the audience on the work they are currently doing. The first question from the moderator went to Dr. Ed Carr and asked about examples of success in university USG research and methods for refining those and creating tools. His answer spoke of resilience as a means to the end of achieving development goals, rather than it being the ultimate goal. He noted that universities are already contributing to USG resilience efforts, illustrating this point through the example of a project that engaged academic tools for qualitative research, and as a result was able to identify and avoid a proposed intervention that not only would have failed to achieve project goals, but likely would have caused the domestic violence rate to spike in the target communities. Dr. Cissé then brought in the panel to expand upon this question.

The next question was directed to Josh Ayers and it dealt with challenges to inter-disciplinary collaboration. He responded with a conceptualization of resilience as capacities and the access to all the capitals (e.g. physical, social, human, natural, political, and financial) of capacity presented, emphasizing that resilience is more than the availability and access to those capitals, *but should include the myriad ways in which people employ combinations of those capitals and assets for recovery*. Understanding why and how populations draw on these combinations of capitals and resources is perhaps the next frontier in resilience research. He suggested funding research in a way that allows for finding a way to “come to know what our unknown unknowns are.” This perhaps requires research teams to evolve over time, depending on the needs that arise. He cited a Refine & Implement approach employed by USAID Food for Peace as a possible way to first understand the unknowns, and then refine the research questions and the requisite team of researchers to answer those questions for improved transdisciplinary research. Jennifer brought in Ed Carr and the rest of the panel to comment on this notion of future funding opportunities.

Dr. Cissé then asked Dr. Griffin about incompatibility between working with government on tools and evaluations, particularly tenure and academic promotion. Her response was that there was a misconception about the overall development goals between government and academia. She asserted that publishing and also pushing forth the development endeavor is possible. A factor here is the motivation of students. Thinking of ways to cultivate training and offering non-traditional academic appointments is a way to clear up any incompatibility. Jennifer opened up the panel for further comments on this topic.

Another question went to Dr. Nancy Mock about training the next generation to meet the challenges of resilience raised during the meeting. Dr. Mock answered with thinking about what universities are currently bringing to the table. The leadership machine, she described, functioned as a pipeline approach through academia. She urged to think about this as broad and very specific programming.

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Broad in the sense that the supply and demand for risk resilience analytical information should be influenced. The demand is generated by mainstreaming resilience thinking into an undergraduate curriculum. The specific can be developed through specific degree and certificate-bearing programs. She advocated for creating a credentialed workforce in this area. Jennifer asked the other panelists to comment on the question on hand.

Before moving to the broad Q&A portion of the session, Dr. Cissé asked each panelist to give “an out of the box” idea that could have large impacts on how U.S. academia and USAID work together to further resilience measurement and practices.

## Public Comment Period

**Moderator: Mark Keenum, President, Mississippi State University and BIFAD chair**

Dr. Keenum began the commenting period by thanking the previous panel for their discussion. An audience member began the period by asking about using real-time data sources with monitoring evaluation programs. Dr. Lackey answered the question by speaking about the need for data to be statistically significant to reduce risk metrics. He also spoke of the ability to match data with emerging technologies. Another audience member asked about scaling and the kinds of interventions that can be scaled. She also asked about getting the best balance of investments for systemic changes versus sets of interventions that have high impacts for small groups of people. Dr. Keenum's response dealt with a critical crisis response system that can strategically address long-term implications. He went on to highlight the challenges of addressing resilience in the future when the world's population is projected to be at 10 billion people. Dr. Anderson spoke of the importance of leadership in these programs and turning crises into opportunities.

An online question posed to the group was about panel studies and minimizing bias in household studies. Another focused on the requirements to obtain RIMA while one asked about the key factors needed to measure farming resilience. In response to the first question, one of the speakers answered by speaking on the importance of propensity score matching to get the best results. The group discussion moved on to a discussion on universities remaining agile and flexible. This allows for a free flow of projects and ideas. Dr. Mark Conostas took the podium to wrap up the meeting and make some closing comments.

He began his remarks by acknowledging the productivity that came out of the panel. He referred to the question of, "what aspects of resilience measurement is capacity development needed?" as the basis for his summary. He offered suggestions in the form of more focused programs to improve resilience measurement.

First, he talked about the theoretical foundations for resilience measurement. There are different theories and principles that work and these need to be clearly articulated and seen as opportunities.

Second, resilience measurement that models systems and identifies metrics incorporates a system's perspective into resilience measurement.

Third, resilience measure that highlights the value of qualitative methods and demonstrates the importance of fine-grained analysis.

The fourth area is the need for resilience measurement that reflects both contextual sensitivity and identifies common core indicators.

A fifth area of work that needs to be carried out to strengthen resilience measurement and where

capacity needs to be developed is criteria guidelines that draw attention to the importance of subjective measures as a central element of resilience measurement.

The sixth topic that needs attention is contextualizing and operationalizing a culture of actionable evidence. Actionable evidence is thematic; measurement's purpose is to produce actionable evidence.

In terms of structural innovations, Dr. Conostas advocates for building networks of graduate students and early professionals.

Secondly, he believes in creating and fostering collaborations and partnerships in field settings. This helps to become smarter about what needs to be measured in the first instance.

Third, he calls for more innovative curriculums and looking more clearly into the future.

A fourth form of innovation is to create a platform for shared indicators. This allows people to get beyond the impediments that go along with intellectual property.

The fifth one is to create an inventory of the array of institutional resources that already exist. Before creating new platforms, it is important to create a clear sense of what already exists.

Following this recap, Dr. Keenum took the podium and expressed deep gratitude for his fellow Board members' participation and for the audience's engagement throughout the two days of meeting.